formed as to whether central time is always used at Marion). The meteor is said to have been—

Coming toward the earth at an angle of 45°, and shortly after it passed over Marion an explosion was heard like that of the heavy discharge of nitroglycerin. The brightness was sufficient to turn night into day. The light of the moon was smothered in the light given out by the great ball of fire as it passed overhead from north to south. The ball was a dark red, like burning coal, and followed by a flaming tail. It was also accompanied by three other flames of fire. The explosion was heard as far as Jonesboro, Hartford City, Montpelier, and Upland.

THE PECULIARITIES OF CALIFORNIA NORTHERS.

Prof. Alexander G. McAdie makes the following remarks in a letter to the Editor dated August 7, 1903:

I have read with the greatest interest the translation by Dr. Cleveland Abbe, jr., of a lecture delivered by Professor Ebert on "Atmospheric electricity considered from the standpoint of the theory of electrons." (See MONTHLY WEATHER REVIEW, May, 1903, p. 229.) What particularly interests us in California is the reference to the distribution of electrons in the air of the Foehn. We have what is generally known as a "norther" in California—one of the most distressing features of our climate. It is a common saying that no wise man will enter into a discussion when the north winds blows. It is a very dry wind and irritating to a high degree. It has always been supposed that these north winds were highly electrified, and one might well believe so, as there must be great friction in the rapid rushing of the abnormally dry air from the mountain ridges down into the valleys.

I wish that the problem might be taken up, either at Stanford or at Berkeley University, but I fear there will not be any considerable amount available for the prosecution of such experiments. There is no land under the sun where climate is so much talked about as it is in California, and where, from a purely commercial standpoint, climate is capital.

OUR CLIMATOLOGICAL PUBLICATIONS.

The monthly reports and annual summaries published by the respective Climate and Crop sections contain a mass of valuable climatological data that is highly appreciated by those who have occasion to study the prominent features of the climate of the United States. Besides giving monthly means and extremes of temperature, rainfall, clear days, and prevailing winds, we have also in many cases full statements of snow, frosts, floods, and in perhaps every case a detailed account of the relation between the weather and the crop of the current year. In general, the maximum and minimum temperatures and the monthly and annual mean temperatures and total rainfalls, as also the departures from normal, are given for every station in an annual summary; analogous data for every day are given in the respective monthly reports. An average of 108 or 116 quarto pages is thus published annually by each of the 45 sections, and the sum total of 5000 pages yearly is a magnificient contribution to the study of climatology, the importance of which will be appreciated more fully by future generations.

Although these publications issue in large numbers from month to month, still they are only in pamphlet form, and it is extremely difficult to obtain a complete set for the whole of the United States. Such sets will always be highly prized by public libraries to which engineers, physicians, statisticians, and others must resort for consultation. We can, therefore, not refrain from urging that each section director see to it that sets of his own publications are preserved in the great State libraries and famous public libraries of the country. Certainly every section should have on its list of recipients such libraries as the Boston Public, the New York Public, the Philadelphia Public, the Library of Congress, the Meteorological libraries of Johns Hopkins, Chicago, Berkeley, Leland Stanford, Cornell, Yale, and Harvard universities; the library of the meteorological observatories at Blue Hill, Mass., and Central Park, New York City.

As back numbers, and especially complete sets of back numbers, of these monthly section reports are rare and much to be desired, we can but urge those voluntary observers who receive the reports to carefully preserve them, and see that eventually they are deposited where they will be permanently cared for and frequently used.

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. David Cuthbertson, Local Forecaster, Buffalo, N. Y., reports that during January four classes in physical geography from the high schools of Buffalo and neighboring cities visited the office and received instruction from his assistants, Mr. W. J. A. Schoppe and Mr. F. T. Williams, in the construction and use of the station instruments, the preparation of weather maps and forecasts, as well as the general workings and benefits of the Bureau. In each case the instruction was varied to suit the needs of the class.

Mr. J. Warren Smith, Section Director, Columbus, Ohio, delivered an illustrated lecture upon the work of the Weather Bureau before the Central Ohio Farmers' Institute, Westerville, Ohio, January 30, 1904.

During the month of January two classes in physical geography from the city high schools, accompanied by their teachers, visited the office, and listened to a brief lecture on the instruments at the station and the work of the office.

Mr. H. C. Bate, Local Forecaster, Nashville, Tenn., states that the weather map and the art of forecasting are studied daily in the public schools and high schools of that city. Several private schools also take up the subject, and the students from these schools as well as from the Nashville University frequently visit the office of the Weather Bureau.

Mr. Robert Q. Grant, Observer, La Crosse, Wis., recently entertained the Nineteenth Century Club of that city at the office of the Weather Bureau, and gave an exposition of the theoretical and practical branches of meteorology.

Mr. J. R. Weeks, Observer, Macon, Ga., delivered during January a series of lectures for the benefit of the Macon Hospital.

Mr. W. M. Wilson, Section Director, Milwaukee, Wis., lectured on the Weather Bureau and its methods on January 16, in the Y. M. C. A. Hall of that city.

Mr. S. W. Glenn, Local Forecaster and Section Director, Huron, S. Dak., states that the teachers of the class in physics of the Huron High School have given special attention to meteorology. On January 22 and 27 the class visited the office of the Weather Bureau, inspected the instruments and listened to an hour's talk by Mr. Glenn.

Mr. P. H. Smyth, Observer, Cairo, Ill., has promised to address the Illinois State Convention of County Officials at Cairo, February 9, on the value of the Weather Bureau to commerce, agriculture, and navigation.

The class in physical geography at Hunter, Okla., maintains a weather record, and is studying the daily weather maps.

HURRICANE OF AUGUST 14-15.

In the MONTHLY WEATHER REVIEW for September, 1903, p. 415, is given the record of the hurricane of August 14-15, as reported by Capt. J. Elligers, jr. At that time, the exact loca-

tion of the vessel could not be given, but has lately been obtained by Mr. W. C. Devereaux, Assistant Observer at Havana, Cuba, and the record is here published as given by the captain of the *Jason*.

Date.	Hour.	Latitude, north.	Longitude, west.
		° ′	° ′
August 14.....	4 a. m....	22 29	95 43
14.....	8 a. m....	22 33	95 18
14	12 noon...	22 35	95 5
14.....	4 p. m....	22 35	94 59
14.....	8 p. m....	22 36	94 52.5
14.....	9 p. m ...	22 36	94 51
14.....	10 p. m....	22 41	94 47
14.....	12 midn't	22 49	94 42
15.....	4 a. m....	23 0	94 34
15.....	8 a. m....	23 4	94 25
15.....	12 noon...	23 7	94 19

CONDITION OF THE OCEAN.

An agreement has been entered into between the United States Weather Bureau, the United States Hydrographic Office, and the Director of the Meteorological Service of the Azores, Capt. François S. Chaves, in accordance with which all reports as to the condition of the ocean, all local meteorological data, and all information regarding derelicts, wrecks, and icebergs will be cabled immediately to the Weather Bureau, for which purpose the ocean cable service between Horta and New York is free up to a limit of thirty words daily. Copies of all such reports will be transmitted immediately by the Weather Bureau to the Hydrographic Office and to all other interested parties.

PATHS OF STORM CENTERS.

A recent number of the Register and Leader, Des Moines, Iowa, January 24, contains an article by Mr. H. A. Campbell, of that city, elucidating the general principle that storm centers or centers of low pressure move in quite regular paths across the American Continent, and that these paths are located farther north or south from time to time. A given region, such as Iowa, may for months together lie entirely south of the paths, and therefore enjoy mostly clear, pleasant, or dry weather; while at other times the paths of the storms pass over the region in rapid succession, and give it a long rainy season.

After the long drought of 1901 the belt embracing the paths of the lows moved farther to the south. After June 10, 1902, this belt was about 1200 miles wide, and 60 lows were recorded in it between June 11 and September 1, while only two were south of the Great Lakes and entirely out of the belt.

From September 18, 1903, to January 14, 1904, Mr. Campbell finds the great majority of storms confined within this same general belt. When storms move from west to east within this belt, only light rains, or perhaps entire droughts, occur in Iowa or other States south of the line from New York, N.Y., to Victoria, Vancouvers Island.

During the summer of 1894 an unprecedented drought prevailed in Iowa, while the belt within which the storm paths occurred lay far to the north, stretching from east to west across British America. There were many storm paths in that region, but none far enough south to bring rain to Iowa.

All modern weather bureaus base their forecasts on the daily weather map, and all monthly weather reviews or annual summaries show the paths that storm centers have pursued as they moved over the surface of the globe. As far back as 1872 it was the custom in the Weather Bureau for the forecaster who went off duty at the close of any month to explain to the one who relieved him that recent maps had shown that the general movement of the centers of low pressure was faster or slower and farther north or farther south, as the case might be, so that the incoming official could make a proper allowance for this variation in his daily forecasts. In the MONTHLY WEATHER REVIEW, beginning with January, 1873, it began to be the custom to call attention to the fact that the average latitude of the paths of low pressure had, during a given month, been somewhat to the north or south, east or west of their usual position. In a general chart showing the average frequency of storm tracks, compiled by the Editor for the statistical atlas of the Census Bureau in 1874, it was shown that the belt of greatest frequency seemed to pass centrally over our Lake region, and thence eastward to Newfoundland. Finally, in 1893, in Weather Bureau Bulletin A, or "Summary of International Meteorological Observations," there are given charts compiled by Professor Garriott showing the average and principal storm tracks and storm frequency, month by month, over the whole Northern Hemisphere. The belt of greatest storm frequency extends from near Sitka southeastward to Duluth, thence eastward to St. Johns, Newfoundland.

This belt may be said to begin in the Philippines. It extends east-northeast over Japan and the Aleutian Islands before reaching Sitka. It also extends from New Foundland eastward to the mid-Atlantic, after which it branches southeastward to France and Turkey, and northeastward to Norway, Sweden, northern Russia, and Siberia, where it seems to be lost. Possibly more perfect weather charts of central Asia would enable us to trace this belt around the globe, but there is some reason for believing that it really does come to an end, and that general storms are infrequent in northern China and Siberia, although local rains must occur. The average movement of storms along this great belt is variable; many of them of course die out entirely, but others soon take their place. During the ten years, 1878–1887, for which Mr. Garriott's charts hold good, the velocity of progress of the strom centers within this belt of greatest frequency varied from seven miles an hour in one portion of the belt during the month of April, to thirty-seven miles an hour in another portion in January and February. The average eastward velocity for all storms and portions of the belt was 22 miles per hour, but the average within the United States was 30 miles per hour; over the North Atlantic Ocean, 20 miles; over Europe, 18 miles; over Japan, 23 miles; over Bering Sea and the Aleutian Islands 20 miles; along the coast of Alaska, 18 miles.

All storms that begin in the northern trade wind region move westward and slowly northward, until they have entered the region of westerly winds, latitude 25° or 30°, after which they move northeastward until they enter the belt of greatest storm frequency. The average motion westward during the first part of their course is 23 miles per hour; the average motion eastward is about twenty-two miles per hour, according to Professor Garriott's tables.

The path of greatest storm frequency seems to coincide with the average dividing line or boundary between regions of cold northerly and warm southerly winds. It also coincides nearly with the trend of the isobars at 3 miles above the earth's surface, but the speed of movement of the storm center has nothing to do with the speed of the lower wind as it blows around that center. It may possibly have some connection with the general speed of the upper currents of air, as they blow around the polar region in connection with the isobars at the 3-mile or some other upper level. It may, therefore, be approximately true that the upper air blows eastward with an average velocity over the North American portion of this belt of 30 miles per hour throughout the year. This may be equivalent to saying that in the latitude of 50° north the layer of air that determines the movement of the storm centers, provided we think of them as drifting along with that layer, must be moving at such a rate that it passes from longitude 140° west eastward to longitude 50° west, that is to say, one quarter of the way around this small circle of latitude in about five and one-half days.